

ECE 6532 / CS 6640/ BIOEN 6640 Image Processing

Assignment 5

General guidelines:

- **Deadline: November 30, 23:59.**
- For book questions, reference for 3rd edition as well as International editions are provided. However, please make sure to validate question numbers in your book with a 3rd edition.

MATLAB question guidelines:

- Name the .m files with the same name as the function.
- You are not allowed to use any functions from the MATLAB Image Processing Toolbox or any other toolboxes in your methods. Only functions that are part of the basic MATLAB package may be used.

Submission guidelines:

- All submissions must be done using Canvas.
- The submission should contain exactly two files - report (pdf) and code + data (zip).
- Answers to theoretical questions should be as concise and precise as possible.
- For programming questions, report should contain following:
 - You are required to explain your understanding of the question.
 - Technical details of the method such as any parameters used. If you find a specific value works best, a discussion on findings using other values is required OR the process involved in finding correct set of parameters. You are encouraged to play with different parameter values and discuss and findings.
 - Results and discussion: report the findings and discuss output images with respect to input images and expected output. It is preferable to add any contradictory results, if found, with brief comments about why it should/not be.
- Report would be used for evaluation and code might be verified for correctness as well as to match the results. Results in the report must correspond to results obtained from running the code.

QUESTIONS

1. Textbook question 7.4
2. Textbook question 7.21 parts a and b only
3. Textbook question 9.6 parts a and b only
4. Mathematical morphology
 - (a) Load *brain.png* from the example images link at the bottom of the class web page. This is a vertical cut through the head. The ventricle is the dark region in the middle of the image. Find a threshold to segment the ventricle, of course, the background etc will be detected as well. Show the thresholded image.
 - (b) Implement the connected components algorithm we discussed in class. Use the location (132,76) as the seed point, apply region growing to your thresholded image to segment the ventricle alone. Submit your code and describe it.
 - (c) Add Gaussian noise to the image using the command $I_{noisy} = I + 30 * randn(256)$. Does region growing still work successfully by itself? Find a solution using mathematical morphology that creates an acceptable segmentation. Describe your solution and show your result. Also submit the code that implements your solution.